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Sustainability adoption through buyer supplier relationship across supply chain: A literature review and conceptual framework

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ABSTRACT

The sustainability of an entire supply chain and the final product is affected by the sustainability performance of each partner in the chain. The buyer-supplier relationship plays an important role in improving sustainability of the supply chain. This paper aims to provide a systematic review of existing literature on the adoption of sustainability practices through supply relationships. To this end, a structured literature review has been carried out that analyzes published research, evaluates contributions, and summarizes the results. The authors selected only those papers that discussed sustainability practices adoption and relationship management in the supply chain. An in-depth analysis of the supply chain and its processes reveals that a buyer-supplier relationship should be determined on the basis of the capability and capacity of the partner (supplier). In cases where the supplier firm lacks capability or capacity, the focal firm may decide to help or extend support. The buyer-supplier relationship starts with selecting suppliers based on their sustainability standards. In order to give a better understanding of the mechanisms active, and processes involved in the development of a sustainable supply chain, the authors offer a conceptual model. The study also identifies indicators, enablers and barriers to a sustainable supply chain.

1. Introduction

Although the number of studies on sustainability is on the rise, these studies fail to clearly explain how to implement sustainability practices (Seuring & Muller, 2008; Pagell & Shevchenko, 2014). Supply chain is a process that involves various stages of production and each stage affects sustainability of the final product (Bommel, 2010; Vachon & Klassen, 2006) due to the social and environmental burdens imposed in the initial stages of the supply chain (Micheleson, 2007; Darnall, 2008). Sustainability practices adoption across supply chains has become a matter of increasing concern over time, and come under the scanner of the media and many NGOs (Rao & Holt, 2005). Recently, Apple was under question due to some unsustainable practices followed by one of its suppliers in China (Garside, 2013). In this case, Apple is a 'focal firm' facing pressure from external agencies on sustainability issues. A focal firm is a firm that generally owns a brand, is involved in the designing of products and services, and rules the supply chain (Seuring & Muller, 2008).

Focal firms need to develop a system to promote sustainability across the supply chain to avoid any negative associations that could potentially harm their reputation (Cote et al., 2008). Along with focal firms, supplier firms should also support sustainability practices adoption to avoid any circumstance that may result in loss of business. There generally are two motivating factors behind adoption of sustainability practices by firms in the industrial environment (Hsu et al., 2013): First, the majority of firms adopt sustainability practices due to external pressure from multiple agencies such as NGOs, governments, customers and other stakeholders (Clemens & Douglus, 2006). Second, companies seek opportunities from sustainability practices adoption in order to gain marketing and competitive advantages, increase employee retention and improve reputation (Walker et al., 2008; Cote et al., 2008). In both situations, the supplier firm faces certain economic, technological and operation-specific barriers. Thus, firms require effective strategies to overcome these barriers in order to make the supply chain more sustainable.

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The main problem with adopting sustainability practices is the lack of required capabilities for sustainability management (Kudla et al. 2012). However, this limitation can be overcome if the buyer and supplier firms share one another's capabilities and work in close proximity (Ronchi et al., 2007; Micheleson, 2007). Although a sustainable supply chain is achievable by developing relationships with supply chain partners (Walton et al., 1998; Cali, 2008), literature on buyer-supplier relationship focuses on determining the magnitude of this relationship with respect to specific suppliers, and the tradeoff between cost of relationship and relationship performance. The magnitude of a relationship depends upon the capacity, capability and intention of the supplier to adopt and accept sustainability standards (Vachon & Klassen, 2008; Hall, 2000; Ageron et al., 2011; Salloum et al., 2015).

Due to a lack of consensus among existing studies on how to develop a sustainable supply chain, there is a need to determine generally acceptable sustainability practices adoption mechanisms and related activities. Seuring & Muller (2008) presented a review of 191 papers that conceptualized the framework of, and a model to develop a sustainable supply chain. Carter & Roger (2008) also proposed a sustainable supply chain framework in their paper which focused on balancing economic, environmental and social sustainability. Gimenez & Tachizawa (2012) reviewed 41 research papers on sustainable supply chains and emphasized the importance of a governance mechanism in developing a sustainable supply chain while also identifying the enablers of this governance mechanism.

This study contributes to existing literature on sustainable supply chains by providing a systematic review of literature on sustainability practices adoption through buyer-supplier relationship management across supply chains. The paper benefits both practitioners and academics; researchers will benefit from the comprehensive information on sustainable supply chain and professionals of supplier and buyer firms will gain a deeper understanding of the processes, indicators, barriers and enablers of adoption of sustainable practices in the supply chain.

The rest of the paper is structured as follows: The next section describes the procedure followed for the search and selection of literature. Section 3 presents a taxonomical analysis of literature selected. Section 4 gives an elaborate conceptual analysis of literature. This analysis comprises: identification of indicators of a sustainable supply chain; determination of triggers, enablers and barriers of sustainability adoption; and explanation of importance of buyer-supplier relationship in a sustainable supply chain. The analysis is concluded by presenting a conceptual model for developing a sustainable supply chain. The outcomes of the each section/subsection are discussed at the end of respective section/ subsection. Finally, conclusions and implications of the study are given in section 5.

2. Literature Search and Selection

Fink (2008) stated, "A literature review is a systematic, explicit, and reproducible design for identifying, evaluating, and interpreting the existing body of recorded document". The literature review in this paper accomplishes the following:

1) Relevant patterns, themes, and issues in publications are identified and summarized.
2) A conceptual framework and corresponding theory for supply chain sustainability are developed.

For the purpose of this study, papers published in peer-reviewed journals of management were targeted. The literature review covered papers published over 20 years, from 1994 to 2013. 1994 has been taken as base year because no significant study on sustainability of supply chain was found before that year. Nearly all research papers on sustainable supply chain, green supply chain, reverse logistics, eco-friendly supply chain, eco-efficient supply chain, social standards and green logistics were identified (Tuteberk & Wittstruck, 2010). Multiple databases such as ABI Informa, Elsevier Science Direct, JSTOR, Emerald, Taylor and Francis, EBSCO (Business source complete), John Willey, and Springer were used to select literature.

Papers were selected based on the following two criteria:

1. The paper must have included an aspect of sustainability (environmental, social and economic) and its implementation in a supply chain.
2. The paper must have discussed relationship management with supply chain partners.

Papers fulfilling these criteria were selected from databases. The initial search was conducted using the following key words: sustainability, environmental supply chain, sustainable supply chain, reverse logistics, green supply chain, social supply chain, and relationship management. Key words related to sustainability and relationship management were used in different combinations (e.g. environmental supply chain–buyer supplier relationship, reverse logistics–relationship management, social supply chain–buyer supplier integration). This search yielded 1,408 papers. After removing duplicates, the number of papers was reduced to 597. A careful reading of abstracts led to further elimination of 350 papers leaving the authors with 247 papers. These papers were then given complete reading and 102 papers were finally selected.

3. Taxonomical Analysis of Literature

The number of papers selected for this study was 102. The majority of papers have been published in the Journal of Cleaner Production (13), followed by Supply Chain Management: An International Journal (10). Other environment oriented journals published (Management of Environmental Quality: An International Journal, Business Strategy and Environment and others) 11 papers. Journals focusing on business strategy accounted for 8 publications. A significant number of papers came from journals discussing operation and logistics, such as International Journal of Operations & Production Management (5), European Journal of Operational Research (1), International Journal of Physical Distribution & Logistics (6).

Some of the papers selected were published in journals from diverse disciplines such as: Journal of Wine Research, Biological Science, Employee Responsibilities and Rights Journal, Corporate Governance and Corporate Environmental Strategy.

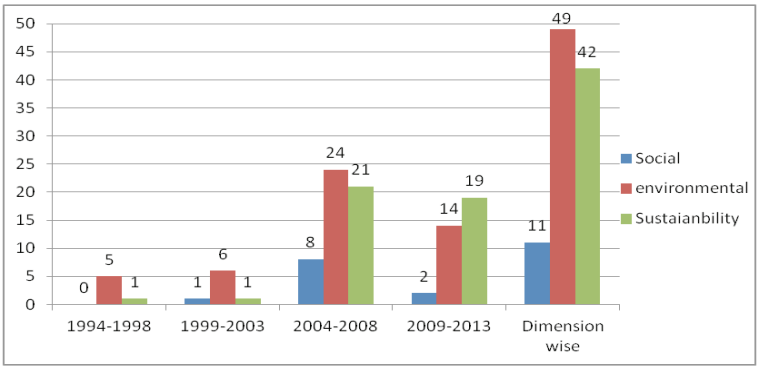

Figure 1 Distribution across sustainability dimension and time period

Very few studies on social sustainability of the supply chain have been conducted. The first paper on social sustainability and supply chain relationships was by Carter & Jenning, and was published in 2002. Figure 1 shows the distribution of papers published over four 5 year intervals during 1994-2013.

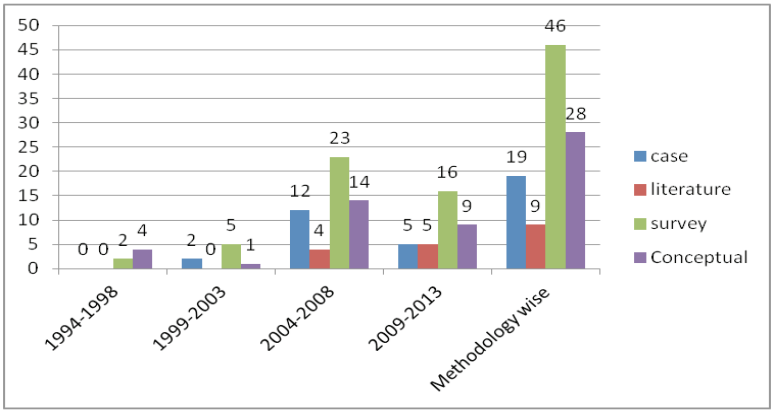

Figure 2. Methodology wise distribution

Figure 2 shows the distribution of research papers based on methodology used over four 5 year intervals during 1994-2013. Nineteen authors used the case study approach. The first case study based paper was by Hall in 2000. In 2005, there were four case study based papers that focused on food, manufacturing, automobiles and companies that integrated environmental practices. 46 studies have used survey method while 37 papers were literature reviews (9) and conceptual development (28).

4. Conceptual Analysis of Literature

4.1 Sustainable Supply Chain

Only a sustainable supply chain can deliver a sustainable product (Mahler, 2008). Hence, the majority of research on sustainability in the business context is oriented towards the supply chain (Carter & Roger, 2008).

Carter & Roger, (2008) defined sustainable supply chain management as,
"*The strategic achievement and integration of an organization's social, environmental, and economic goals through the systemic coordination of key inter-organizational business processes to improve the long-term economic performance of the individual company and its value network*".

According to Seuring & Muller (2008), sustainable supply chain is "*the management of material, information and capital flow as well as cooperation among companies along the supply chain while taking goals from three dimensions of sustainable development, i.e. economic, environmental and social, into account which is derived from customer and stakeholder requirements*".
These definitions have inspired research on supply chain with three dimensions of sustainability, and emphasized the importance of cooperation among supply chain partners. The various indicators of a sustainable supply chain have been divided into three categories as proposed by Elkington (1994): environmental supply chains, social supply chains and economic supply chains.

4.1.1 Environmental Supply Chain

An environmental supply chain primarily encompasses activities that affect the environment (Simpson & Power, 2005). Literature has discussed dimensions and activities related to environmental sustainability of the supply chain (Table 1) and companies adopt these activities to increase the sustainability of the supply chain.

Table 1 shows that all indicators of the environmental supply chain are concerned with reducing the amount of material used in the production process, handling emission and waste, minimizing energy use, looking for substitute input material, designing products considering environmental suitability, reverse logistics and disposal of products, and improvement in packaging. The use of cleaner technology, renewable energy sources, and green purchasing are also mentioned in extant literature.

Table 1: Indicators of environmental supply chain

Dimension	Reference
Packaging improvements	Rao & Holt, 2005; Tsoulfas & Pappis, 2006; Hall, 2000; Bai & Sarkis, 2010; Vachon, 2007; Zhu et al., 2007a; Handfield et al., 2005; Ciliberti, 2008; Preuss, 2005; Ni et al., 2010; Cai et al., 2008; Muller et al., 2009;
Energy efficiency	Wu & Pagell, 2011; Nakano & Hirao, 2011; Zhu et al., 2008b; Smith, 2007; Bai & Sarkis, 2010; Zhu et al., 2007b; Matos & Hall, 2007; Ciliberti, 2008; Zhu & Sarkis, 2004; Carter & Jenning, 2002; Closs et al., 2010; Kushwaha, 2011; Vermeulen & Ras, 2006; Muller et al., 2009; Smerecnik & Anderson, 2011; Zhu & Sarkis, 2010; Luthra et al., 2011; Cote et al., 2008; Vachon & Mao, 2008; Young & Kielkiewicz-Young, 2001
Pollution & emission minimization	Carter & Rogers 2008; Klassen & Vachon, 2003; Vachon & Klassen, 2008; Tsoulfas & Pappis, 2006; Vachon & Klassen, 2006; Bai & Sarkis, 2010; Vachon, 2007; Rao, 2002; Zhu et al., 2007a; Matos & Hall, 2007; Ciliberti, 2008; Zsidisin & Hendrick, 1998; Ni et al., 2010; Carter & Jenning, 2002; Ageron et al., 2011; Cai et al., 2008; Muller et al., 2009; Smerecnik & Anderson, 2011; Zhu & Sarkis, 2010; Brito et al., 2008, Luthra et al., 2011, Beske et al., 2008; Hsu et al., 2013; Kudla et al. 2012; Carbone & Moatti, 2011
Waste minimization	Wu & Pagell, 2011; Carter & Rogers 2008; Asif et al., 2008; Salam, 2008; Zhu et al., 2008a; Rao & Holt, 2005; Walker et al., 2008; Zhu et al., 2008b; Green et al., 1998; Bai & Sarkis, 2010; Rao, 2002; Zhu et al., 2007a; Matos & Hall, 2007; Bitzer et al., 2008; Florida, 1996; Ciliberti, 2008; Zsidisin & Hendrick, 1998; Preuss, 2005; Ni et al., 2010; Closs et al., 2010; Kushwaha, 2011; Ageron et al., 2011; Cai et al., 2008; Muller et al., 2009; Fortes, 2009; Luthra et al., 2011; Buyukozkan & Cifci, 2010; Ashby et al., 2012; Beske et al., 2008; Cote et al., 2008; Vachon & Mao, 2008; Young & Kielkiewicz-Young, 2001; Hsu et al., 2013
Reverse logistics	Teuteberg & Wittstruck, 2010; Asif et al., 2008; Lin, 2007; Diabata & Givindanb, 2011; Holt & Ghobadian, 2009; Routroy, 2009; Svensson, 2007; Wu & Pagell, 2011; Zhu et al., 2008a; Rao & Holt, 2005; Ytterhus, 1999; Vachon & Klassen, 2008; Vachon & Klassen, 2006; Bai & Sarkis, 2010; Eltayeb et al., 2011; Zhu et al., 2007b; Vachon, 2007; Olorunniwo & Li, 2010; Zhu et al., 2007a; Handfield et al., 2005; Bitzer et al., 2008; Florida, 1996; Ciliberti, 2008; Zsidisin & Hendrick, 1998; Preuss, 2005; Zhu & Sarkis, 2004; Ni et al., 2010; Carter & Jenning, 2002; Kushwaha, 2011; Linton et al., 2007, Ageron et al., 2011; Muller et al., 2009; Daugherty, 2011; Fortes, 2009; Svensson, 2009; Hsu et al., 2013
Green purchasing	Diabata & Givindanb, 2011; Routroy, 2009; Green et al., 1998; Bai & Sarkis, 2010; Eltayeb et al., 2011; Zhu et al., 2008a; Hsu et al., 2013; Zhu et al., 2007a; Peters et al., 2011; Bitzer et al., 2008; Ciliberti, 2008; Ni et al., 2010; Carter & Jenning, 2002; Luthra et al., 2011
Reducing input material	Salam, 2008; Smith, 2007; Bai & Sarkis, 2010; Zhu et al., 2007a; Bitzer et al., 2008; Ciliberti, 2008; Ni et al., 2010; Carter & Jenning, 2002; Closs et al., 2010, Cai et al., 2008; Vermeulen & Ras, 2006; Muller et al., 2009; Smerecnik & Anderson, 2011; Bowen et al., 2001; Beske et al., 2008; Vachon & Mao, 2008
Environmental/ Green designing	Holt & Ghobadian, 2009; Routroy, 2009; Zhu et al., 2008b; Bai & Sarkis, 2010; Eltayeb et al., 2011; Hsu et al., 2013; Zhu et al., 2008a; Zhu et al., 2007a; Hong et al., 2009; Carter & Jenning, 2002; Linton et al., 2007; Cai et al., 2008; Markley & Davis, 2007; Sarkis, 1995; Carbone & Moatti, 2011
Material substitution	Svensson, 2007; Bowen et al., 2001
Eco labeling	Hamprecht et al., 2005; Vachon & Klassen, 2006; Vachon, 2007
Renewable energy	Smith, 2007; Bai & Sarkis, 2010; Zhu et al., 2007a; Carbone & Moatti, 2011
Cleaner technology	Rao & Holt, 2005; Bai & Sarkis, 2010; Zhu et al., 2007b, Zhu & Sarkis, 2004; Vermeulen & Ras, 2006; Vachon & Mao, 2008

4.1.2 Socially Sustainable Supply Chain

Researchers use social sustainability indicators to define and analyze social sustainability. Cramer (2007) came up with a step-wise model for organizing corporate social responsibility indicators in product chains. Kortelaine (2008) presented a case study of companies in China to explain social sustainability of the supply chain. Ni et al. (2010) presented a mathematical model for social sustainability of two echelon supply chain. Ciliberti et al. (2008) surveyed Italian companies to determine social standards adoption and found that social sustainability practices followed should be reported along with financial reports of companies to promote sustainability in logistics.

Table 2: Indicators of social supply chain

Dimension	Reference	Employee	Community
Working conditions	Pommel, 2010; Carter & Rogers 2008; Carter & Rogers, 2008; Hutchins & Sutherland, 2008; Smith, 2007; Blow field, 2005; Matos & Hall, 2007; Rocha et al., 2007; Bitzer et al., 2008; Ciliberti, 2008; Ni et al., 2010; Carter & Jenning, 2002; Closs et al., 2010; Muller et al., 2009; Brito et al., 2008; Elkington, 1994; Pullman et al., 2010; Markley & Davis, 2007; Ansett, 2007; Beske et al., 2008; Kudla et al. 2012	✓	-
Rights to employees	Bommel, 2010; Carter & Rogers 2008; Blowfield, 2005; Eltayeb et al., 2011; Rocha et al., 2007; Ciliberti, 2008, Ni et al., 2010; Carter & Jenning, 2002; Markley & Davis, 2007; Kortelainen, 2008	✓	-
Fair trade and transparency	Bommel, 2010; Olorunniwo & Li, 2010; Peters et al., 2011; Rocha et al., 2007; Ni et al., 2010; Muller et al., 2009	✓	✓
Education of employees	Hutchins & Sutherland, 2008; Matos & Hall, 2007; Rocha et al., 2007; Ni et al., 2010; Closs et al., 2010	✓	
Career development	Zutshi & Sohal, 2004, Matos & Hall, 2007, Rocha et al., 2007, Ni et al., 2010; Closs et al., 2010; Pullman et al., 2010; Markley & Davis, 2007; Ansett, 2007; Carbone & Moatti, 2011	✓	✓
Work and life balance	Zutshi & Sohal, 2004; Blowfield, 2005; Ni et al., 2010; Markley & Davis, 2007; Ansett, 2007; Kortelainen, 2008	✓	✓
Social welfare	Smith, 2007; Eltayeb et al., 2011; Rocha et al., 2007; Closs et al., 2010; Markley & Davis, 2007; Young & Kielkiewicz-Young, 2001; Kortelainen, 2008	-	✓
Fair wages	Koplin et al., 2007; Rocha et al., 2007; Ciliberti, 2008; Ni et al., 2010; Carter & Jenning, 2002; Ashby et al., 2012	✓	-
Safety	Ciliberti, 2008; Ni et al., 2010; Carter & Jenning, 2002; Muller et al., 2009; Pullman et al., 2010; Markley & Davis, 2007	✓	✓
Health	Hutchins & Sutherland, 2008; Blowfield, 2005; Eltayeb et al., 2011; Matos & Hall, 2007; Rocha et al., 2007; Ciliberti, 2008; Ni et al., 2010; Carter & Jenning, 2002; Closs et al., 2010; Closs et al.; 2010, Muller et al., 2009; Pullman et al., 2010; Markley & Davis, 2007; Beske et al., 2008	✓	✓
Women specific issues	Blowfield, 2005, Matos & Hall, 2007, Rocha et al., 2007, Ni et al., 2010, Carter & Jenning, 2002	✓	-
Local Purchase	Peters et al., 2011, Rocha et al., 2007; Kushwaha, 2011; Pullman et al., 2010,	-	✓
Poverty Reduction	Kortelainen, 2008; Bitzer et al., 2008; Ni et al, 2010	-	✓
Supply from less developed part of society	Ciliberti, 2008; Markley & Davis, 2007	-	✓
Community connection and support	Closs et al., 2010; Pullman et al., 2010; Markley & Davis, 2007; Brito et al., 2008; Vasileiou & Morris, 2006	-	✓
Local hiring	Pullman et al., 2010	-	✓
Ethical codes	Ellis & Higgins, 2006; Keatinga et al., 2008, Buyukozkan & Cifci, 2010; Vasileiou & Morris, 2006	✓	✓
Population change	Hutchins & Sutherland, 2008; Ni et al., 2010	-	✓
Equity of employee and community	Hutchins & Sutherland, 2008; Blowfield, 2005; Koplin et al., 2007; Matos & Hall, 2007; Rocha et al., 2007, Ni et al., 2010; Carter & Jenning, 2002; Closs et al., 2010; Markley & Davis, 2007	✓	✓

Table 2 highlights socially responsible supply chain indicators. The list includes working conditions, career growth opportunities, women and minority specific issues, and the role of supply chain in removing poverty, among others. These indicators are related to society inside and outside the supply chain.

4.1.3 Economic Supply Chain

An economic supply chain is one that enables a firm to timely deliver a product of the best possible quality at least possible cost. Indicators such as optimum asset utilization, reduction in resource use, cost reduction, late delivery and minimum quality-based rejection are part of economic supply chain (Table 3).

Table 3 Indicators of Economical supply chain

Dimension	Reference
Optimum asset utilization	Buyukozkan & Cifci, 2010; Carbone & Moatti, 2011
Reduction in resource use	Tsoulfas & Pappis, 2006; Markley & Davis, 2007
Cost reduction	Walker et al., 2008; Handfield et al., 2005; Zutshi & Sohal, 2004; Holt & Ghobadian, 2009; Rao & Holt, 2005
Late delivery	Walker et al.., 2008; Matos & Hall, 2007; Zhu & Sarkis, 2004
Minimum quality-based rejection	Zsidisin & Hendrick, 1998; Brito et al., 2008; Daugherty, 2011

Thus, it can be said that a supply chain is sustainable when it considers environmental and societal aspects, and develops the capability to produce and deliver products economically.

4.2 Triggers of Sustainability Adoption

As discussed earlier, companies adopt sustainability practices due to external pressure and to gain benefits of sustainability. This section identifies the types of external pressures and benefits companies seek from sustainability adoption.

4.2.1 Sustainability Adoption Due to External Pressure

Sustainability adoption is carried out of pressure from agencies like customer groups, NGOs and other stakeholders. Clemens & Douglus (2006) explored the possibilities of improving sustainability across the supply chain by coercion. González-Benito & González-Benito (2007) published a similar study on the role of stakeholder pressure on environmental practices. All the agencies that drive organizations to adopt sustainability practices are listed in Table 4. External pressure from different agencies not only influences companies to adopt sustainability in their plant operations, but also forces them to extend sustainability across their supply chain (Eltayeb et al., 2011; Ni et al., 2010; Holt, 2009; Walker, 2008; Darnall et al., 2008, Zhu et al., 2008a; Smith 2007; Elingkton, 1994).

Table 4 External Pressure for Sustainability Adoption

External Agency	References
Trade union	Bommel, 2010; Routroy, 2009; Peters et al., 2011
Media	Darnall, 2008; Peters et al., 2011; Markley & Davis, 2007
Industry norms	Darnall, 2008; Ageron et al., 2011
Human right organizations	Bommel, 2010; Peters et al., 2011; Bitzer et al., 2008; Elkington, 1994; Markley & Davis, 2007
Regulatory bodies (laws and regulations)	Teuteberg & Wittstruck, 2010; Asif et al., 2008; Diabata & Givindanb, 2011; Routroy, 2009; Nakano & Hirao, 2011; Clemens & Douglus, 2006; Walker et al., 2008, Ytterhus, 1999; Seuring & Muller, 2008; Michelsen, 2007; Sarkis et al., 2010; Closs et al., 2010; Ageron et al., 2011; Brito et al., 2008, Elkington, 1994; Pullman et al., 2010, Markley & Davis, 2007; Fortes, 2009
Employee unions	Asif et al., 2008; Holt & Ghobadian, 2009; Ytterhus, 1999; Darnall, 2008; Hall, 2000; Eltayeb et al., 2011; Elkington, 1994; Markley & Davis, 2007
NGO	Seuring & Muller, 2008; Lee, 2008; Darnall, 2008; Vachon & Klassen, 2006; Peters et al., 2011; Matos & Hall, 2007; Sarkis et al., 2010; Muller et al., 2009, Elkington, 1994; Markley & Davis, 2007
Society/Community	Asif et al., 2008; Holt & Ghobadian, 2009; Ytterhus, 1999; Darnall, 2008; Hall, 2000; Eltayeb et al., 2011; Elkington, 1994; Markley & Davis, 2007
Focal company influence	Nakano & Hirao, 2011; Rao & Holt, 2005; Darnall, 2008; Hall, 2000; Markley & Davis, 2007; Keatinga et al., 2008; Vachon & Mao, 2008
Civil society	Smith, 2007; Clemens & Douglus, 2006; Bitzer et al., 2008; Elkington, 1994
Trade association	Darnall, 2008; Ageron et al., 2011; Lee, 2008; Elkington, 1994
Consumer groups	Bommel, 2010; Diabata & Givindanb, 2011; Holt & Ghobadian, 2009; Routroy, 2009; Zhu et al., 2008b; Seuring & Muller, 2008; Smith, 2007; Walker et al., 2008, Vachon & Klassen, 2008; Hall, 2000; Matos & Hall, 2007; Sarkis et al., 2010; Closs et al., 2010; Kushwaha, 2011; Markley & Davis, 2007; Buyukozkan & Cifci, 2010; Hamprecht et al., 2005; Cote et al., 2008
Competitor pressure	Diabata & Givindanb, 2011; Holt & Ghobadian, 2009; Ytterhus, 1999; Darnall, 2008; Zhu et al, 2007b; Kogg, 2003; Closs et al., 2010; Elkington, 1994; Pullman et al., 2010; Markley & Davis, 2007

It has been found that regulatory bodies, consumer groups and competitors are the external agencies that most influence/pressurize supply chain partners to adopt sustainability practices. The pressure exerted on companies comes in the form of threat to reputation, penalties and fear of business loss.

4.2.2 Expected Benefits of Adopting Sustainability Practices

The benefits of sustainability adoption motivate supply chain partners to adopt sustainability practices (Young & Kielkiewicz-Young, 2001). These benefits include new market opportunities, customer satisfaction and premium pricing. The benefits are listed in Table 5.

Table 5 Benefits of Sustainability Adoption

Benefits	References
Competition	Diabata & Givindanb, 2011; Holt & Ghobadian, 2009; Ytterhus, 1999
Competitive advantage	Clemens & Douglus, 2006; Walker et al., 2008; Ytterhus, 1999; Vachon & Klassen, 2008; Zhu et al., 2008b; Kogg, 2003; Hong et al., 2009; Olorunniwo & Li, 2010; Zhu et al., 2007a; Peters et al., 2011; Zhu & Sarkis, 2004; Ni et al., 2010; Ageron et al., 2011; Vermeulen & Ras, 2006; Muller et al., 2009; Zhu & Sarkis, 2010; Elkington, 1994; Curkovic & Sroufe, 2010; Cote et al., 2008; Young & Kielkiewicz-Young, 2001; Hsu et al., 2013
Premium pricing	Ytterhus, 1999; Eltayeb et al., 2011, Ageron et al, 2011
Increase quality	Zhu et al., 2008a; Ytterhus, 1999; Eltayeb et al., 2011; Bitzer et al., 2008; Ageron et al., 2011; Ashby et al., 2012; Carbone & Moatti, 2011
Improve corporate Image/ Reputation	Zutshi & Sohal, 2004; Zhu et al., 2008; Smith, 2007; Darnall, 2008; Eltayeb et al., 2011; Zhu et al., 2008a; Simpson et al., 2007; Matos & Hall, 2007; Rocha et al., 2007; Vermeulen & Seuring, 2009; Muller et al., 2009; Keatinga et al., 2008
Cost reduction in long term	Bommel, 2010; Zutshi & Sohal, 2004; Salam, 2008; Holt & Ghobadian, 2009; Rao & Holt, 2005; Clemens & Douglus, 2006; Walker et al., 2008; Lee, 2008; Tsoulfas & Pappis, 2006; Green et al., 1998; Eltayeb et al., 2011; Zhu et al., 2008b; Hong et al., 2009; Zhu et al., 2007b; Rocha et al., 2007; Hsu et al., 2013; Vasileiou & Morris, 2006
Improve operational processes	Zutshi & Sohal, 2004; Holt & Ghobadian, 2009; Bai & Sarkis, 2010; Rocha et al., 2007; Ageron et al.; 2011, Cai et al., 2008; Hsu et al., 2013
Marketing advantage	Smith, 2007; Clemens & Douglus, 2006; Darnall, 2008; Eltayeb et al., 2011; Zhu et al., 2008b, Kogg, 2003; Zhu et al., 2007a; Bitzer et al., 2008; Zhu & Sarkis, 2004; Markley & Davis, 2007
New market opportunity	Holt & Ghobadian, 2009; Clemens & Douglus, 2006; Bitzer et al., 2008; Markley & Davis, 2007
Product differentiation	Kogg, 2003
Customer satisfaction and value	Hong et al., 2009; Smith, 2007; Lee, 2008; Hong et al., 2009; Kushwaha, 2011; Ageron et al., 2011; Smerecnik & Anderson, 2011
Reduction in fines	Zutshi & Sohal, 2004; Rocha et al., 2007; Kushwaha, 2011; Hsu et al., 2013
Increase profitability	Ytterhus, 1999; Darnall, 2008; Salloum et Azoury, 2012; Eltayeb et al., 2011; Zhu et al., 2008a; Zhu et al., 2007b; Carter & Jenning, 2002; Closs et al., 2010; Markley & Davis, 2007

Table 5 shows that the majority of authors recognize that adoption of sustainability practices leads to competitive and marketing advantages, improved corporate image, and decreased pressure from external agencies. In the last two decades, sustainability in the supply chain has provided companies with an opportunity to gain a competitive advantage and address environmental and social issues (Buyukozkan & Cifci, 2010). Bowen et al., (2001) found that when companies acknowledged the financial, marketing and other benefits of sustainability, they were more likely to adopt appropriate sustainable practices. The same was supported by Ytterhus (1999) who concluded that sustainability practices adoption was related to financial and operational benefits. Further, adoption of sustainability practices enables firms to maintain environmental standards (Hall, 2000; Bai & Sarkis, 2010; Sarkis et al., 2010). An increase in profitability and quality are also potential benefits of sustainability practices adoption. Rao & Holt (2005) went on to state that there were economic gains from environmental sustainability in the long run.

Thus, we can summarize:

- The indicators identified from the literature can be used for developing sustainability standards as there is a lack of industry specific sustainability standards (Kudla et al., 2012).
- Based on the literature review, various external agencies have been identified that exert pressure on the supply chain to implement sustainability. There is a need to identify the degree of influence by each external agency.
- Future research should be conducted to determine if different firms prefer some benefits from sustainability practices adoption over others.
- Both external pressure and benefits of sustainability adoption motivate top management towards adopting sustainability practices. The difference between the degrees of influence that these triggers exert should be compared.

4.3 Barriers and Enablers of Sustainability Adoption

Some companies adopt sustainability practices voluntarily while others are forced (Mebratu, 1998). In both situations, supply chain partners encounter many problems in the course of sustainability adoption. These problems are the barriers to sustainability adoption. If companies effectively manage these barriers - either by themselves or with the help of supply chain partners, then sustainability adoption

can fully or partially be solved (Kuhtz, 2007). On the other hand, factors that encourage sustainability practices adoption are called enablers. Developing favorable conditions for the adoption of sustainability practices would enable their acceptance across the supply chain.

4.3.1 Barriers to Sustainability Adoption

A lack of knowledge and expertise within the organization is the main barrier to sustainability adoption (Elkington, 1994; Zutshi & Sohal, 2004). Vachon (2007) found that the lack of knowledge transfer and cooperation, and organizational resistance towards the adoption of environmental technologies for green practices are barriers to sustainability. Florida (1996) and Zutshi & Sohal (2004) studied resistance from employees and supply chain partners towards the development of an environmentally friendly supply chain. Hall (2000) highlighted lack of interest on the part of suppliers as a barrier. Besides, cost related issues also affect greening of the supply chain (Rao, 2002). Cai et al. (2008) reported higher investment and uncertainty of return as significant barriers to going green. A majority of companies assume that sustainability will increase cost and negatively affect overall profit (Salloum et al., 2011; Fortes, 2009). Wermeulen & Ras (2006) identified lack of expertise in the supply chain partners and pressure of lowering cost as major challenges for greening the supply chain. Markley & Davis (2007) mentioned un-affordability of supply chain partners to develop additional financial and employee resources for sustainability. Lack of government support is also one of the causes for slower adoption of sustainability (Lin, 2007).

Table 6 Barriers to Sustainability Adoption

Barrier	Reference
Increased cost of adoption	Carter & Rogers 2008; Salam, 2008; Wu & Pagell, 2011; Rao & Holt, 2005; Walker et al., 2008; Darnall, 2008; Seuring & Muller, 2008; Bai & Sarkis, 2010; Rao, 2002; Zhu & Sarkis, 2004; Carter & Jenning, 2002; Kushwaha, 2011; Linton et al., 2007; Ageron et al., 2011; Cai et al., 2008; Muller et al., 2009; Bowen et al., 2001; Simpson & Power, 2005; Markley & Davis, 2007; Luthra et al., 2011; Buyukozkan & Cifci, 2010; Cote et al., 2008
Focus on short term profitability	Wu & Pagell, 2011; Cote et al., 2008
Perception of low economic return	Nakano & Hirao, 2011; Ageron et al., 2011; Cai et al., 2008; Bowen et al., 2001; Simpson & Power, 2005; Keatinga et al., 2008; Fortes, 2009; Luthra et al., 2011
Lack of money	Klassen & Vachon, 2003; Smith, 2007; Lee, 2008
Lack of integration	Vachon, 2007; Carter & Rogers 2008; Vasileiou & Morris, 2006
No support from government	Zutshi & Sohal, 2004; Lin, 2007
Resistance from suppliers	Zutshi & Sohal, 2004; Lee, 2008
Poor supplier commitment	Diabata & Givindanb, 2011; Rao & Holt, 2005; Carter & Rogers 2008
Lack of partner trust	Bitzer et al., 2008; Senge & Prokesch, 2011
Lack of top management commitment	Rao & Holt, 2005; Walker et al., 2008; Ageron et al., 2011, Luthra et al., 2011
Cultural difference	Blowfield, 2005; Ageron et al., 2011
Lack of training	Zutshi & Sohal, 2004; Walker et al., 2008
Lack of education	Zutshi & Sohal, 2004; Lee, 2008; Kudla et al. 2012
Lack of human resources capability	Wu & Pagell, 2011; Lee, 2008; Markley & Davis, 2007; Luthra et al., 2011
Lack of knowledge	Smith, 2007; Lee, 2008; Bai & Sarkis, 2010; Vasileiou & Morris, 2006
Lack of resources	Clemens & Douglus, 2006; Lee, 2008; Hall, 2000; Kudla et al. 2012
No capability	Lee, 2008; Hall, 2000; Senge & Prokesch, 2011
Outdated auditing standards	Rao & Holt, 2005; Beske et al., 2008; Hamprecht et al., 2005
Poor demand forecasting	Carter & Rogers 2008
No information sharing	Lee, 2008; Seuring & Muller, 2008; Vachon, 2007; Zhu & Sarkis, 2004; Luthra et al., 2011
No technology sharing	Wu & Pagell, 2011; Klassen & Vachon, 2003; Lee, 2008; Bitzer et al., 2008; Zhu & Sarkis, 2004
Lack of awareness	Rao & Holt, 2005; Bitzer et al., 2008

Carter & Roger (2002) and Klassen & Vechon (2003) focused on the perceived increase in cost due to the incorporation of social sustainability standards across the supply chain. They also emphasized upon specific barriers such as poor control and management of environment related problems. Kogg, 2003 discovered that the absence of a powerful focal company led to lack of compliance and support by the supply chain partners negatively affecting the greening of a textile supply chain. Sarkis (2004) found that cost related factors and the reluctance to share product design with supply chain partners acted as barriers to sustainability adoption. A scarcity or complete absence of incentives for green practices such as investment in tools and equipment and initiating changes in the supply process affects the commitment of suppliers' top management (Simpson & Power, 2005). Rao & Holt (2005) pointed out barriers to a greener supply chain in the form of lack of commitment on the part of management, ignorance regarding environmental practices across the

supply chain, poor auditing standards and government rules. In terms of capability, the inability of a supplier to innovate and adopt sustainability practices within the supply chain acts as a barrier. Table 6 shows all barriers as discussed in extant literature.

4.3.2 Drivers and Enablers of Sustainability Practices

Lee & Klassen (2008) distinguished between drivers and enablers. Drivers are factors that initiate a process while enablers help in implementing the process. Drivers help develop commitment towards sustainability among supply chain partners while enablers help implement sustainability practices.

There are a variety of activities that may enable sustainability practices adoption across supply chains. For example, incentives by different agencies such as the government, focal firm, and NGOs can enable sustainability adoption by supply chain partners (Seuring & Muller, 2008; Matos & Hall, 2007). Other incentives include tax benefits for maintaining sustainability practices to reduce cost of adoption (Lin, 2007). Other enablers can be categorized as: 1) External - support from focal firm, top management and government. 2) Mutual - collaboration, integration of resources, sharing of knowledge, joint development activities to enhance mutual trust and commitment (Rocha et al., 2007; Zhu & Sarkis, 2004). Controlling and monitoring the practices of supply chain partners to prevent deviations from sustainability standards can be achieved by developing new auditing standards. In addition, disseminating knowledge about sustainability, providing training, and developing technological knowledge will facilitate the implementation of sustainability. A buyer-supplier relationship based sustainable supply chain encourages capacity building and the development of supply chain partners, and places sustainability practices at the center of policies. Table 7 shows all enablers of sustainability adoption.

Table 7 Enablers of Sustainability Adoption

Enabler	Sources used
External pressure	Routroy, 2009; Klassen & Vachon, 2003; Zhu et al., 2008b; Seuring & Muller, 2008; Smith, 2007; Clemens & Douglus, 2006; Walker et al., 2008, Lee, 2008; Ytterhus, 1999; Vachon & Klassen, 2008; Darnall, 2008; Lin, 2007; Seuring & Muller, 2008; Ytterhus, 1999; Zhu et al., 2008a; Sarkis et al., 2010; Markley & Davis, 2007; Buyukozkan & Cifci, 2010
Incentives and support By various agencies	Bommel, 2010; Lin, 2007; Seuring & Muller, 2008; Matos & Hall, 2007; Bitzer et al., 2008; Simpson & Power, 2005; Cote et al., 2008
Demand of customer and other stakeholders	Rocha et al., 2007; Sarkis et al., 2010; Bommel, 2010; Diabata & Givindanb, 2011; Holt & Ghobadian, 2009; Zhu et al., 2008a; Seuring & Muller, 2008; Smith, 2007; Walker et al., 2008, Vachon & Klassen, 2008; Hall, 2000; Matos & Hall, 2007; Sarkis et al., 2010; Closs et al., 2010; Markley & Davis, 2007
Awareness	Zhu et al., 2008b; Teuteberg & Wittstruck, 2010; Buyukozkan & Cifci, 2010; Rao & Holt, 2005; Ellis & Higgins, 2006; Walker, et al., 2008
Top management commitment and support	Holt & Ghobadian, 2009; Lee, 2008; Zhu et al., 2008a; Hong et al., 2009; Zhu et al., 2007a; Handfield et al., 2005; Rocha et al., 2007; Zhu & Sarkis, 2004; Closs et al., 2010; Ageron et al., 2011; Daugherty, 2011; Ellis & Higgins, 2006
Sharing resources	Ni et al., 2010; Smith, 2007; Lee, 2008; Bai & Sarkis, 2010; Vachon, 2007; Bitzer et al., 2008; Ageron et al., 2011; Elkington, 1994; Wu & Pagell, 2011; Klassen & Vachon, 2003; Lee, 2008; Bitzer et al., 2008; Young & Kielkiewicz-Young, 2001
Capacity building and development	Klassen & Vachon, 2003; Wu & Pagell, 2011; Lee, 2008; Ageron et al., 2011; Markley & Davis, 2007
Joint efforts & planning	Seuring & Muller, 2008; Peters et al., 2011; Florida, 1996; Rao & Holt, 2005; Hong et al., 2009; Zsidisin & Hendrick, 1998
Monitoring & auditing supply chain partners	Clemens & Douglus, 2006; Rao & Holt, 2005; Darnall, 2008; Ageron et al., 2011; Beske et al., 2008; Hamprecht et al., 2005
Competitive and marketing advantage	Walker et al, 2008, Seuring & Muller, 2008; Ageron et al., 2011; Vermeulen & Seuring, 2009; Elkington, 1994; Nakano & Hirao, 2011
Information sharing	Wu & Pagell, 2011; Walker et al., 2008; Lee, 2008; Seuring & Muller, 2008; Vachon, 2007; Zhu & Sarkis, 2004; Darnall, 2008; Nakano & Hirao, 2011
Trust and commitment among partners	Darnall, 2008; Tsoulfas & Pappis, 2006; Markley & Davis, 2007; Nakano & Hirao, 2011; Rao & Holt, 2005; Darnall, 2008; Hall, 2000; Bai & Sarkis, 2010; Markley & Davis, 2007; Keatinga et al., 2008; Bitzer et al., 2008; Senge & Prokesch, 2011; Matos & Hall, 2000
Knowing and solving supply chain partners' problems	Smith, 2007; Lee, 2008; Bai & Sarkis, 2010; Vachon, 2007; Bitzer et al., 2008, Ageron et al., 2011; Elkington, 1994; Wu & Pagell, 2011; Klassen & Vachon, 2003; Lee, 2008; Bitzer et al., 2008; Zutshi & Sohal, 2004; Walker et al., 2008; Cramer, 2007; Young & Kielkiewicz-Young, 2001
Cost reduction	Vermeulen & Ras, 2006; Bowen et al., 2001; Brito et al., 2008; Linton et al., 2007; Ageron et al., 2011; Muller et al., 2009; Bowen et al., 2001; Simpson & Power, 2005; Markley & Davis, 2007; Buyukozkan & Cifci, 2010
Long term Partnership	Walker et al., 2008, Lee, 2008; Seuring & Muller, 2008; Bai & Sarkis, 2010; Zsidisin & Hendrick, 1998; Zhu & Sarkis, 2004; Vermeulen & Ras, 2006, Simpson & Power, 2005; Daugherty, 2011; Attaran & Attaran, 2007; Markley & Davis, 2007

It is thus clear that there are many barriers to sustainability practices adoption, most of which are related to the capacity and capability of the supplier. The impact of these enablers on suppliers' commitment to adopt sustainability practices is an area for future research.

4.4 Buyer-Supplier Relationship in a Sustainable Supply Chain

In order to implement sustainability practices across the supply chain, companies need to develop relationship management strategies that influence and support their suppliers. Sarkis (1995) came up with the concept of environment conscious designing with the help of buyer-supplier relationship. Angeron (2011) emphasized the need of strategic partnerships for proper collaboration among supply chain partners that leads to a sustainable supply chain. Further, supply chain relationships facilitate the adoption of innovative environmental technologies (Zhu et al., 2007a). Upstream and downstream collaborations with supply chain partners are directly related to the adoption of environmental sustainability practices (Vachon & Mao, 2008; Klassen & Vachon, 2003). Some authors have argued that success in environmental sustainability occurs when buyer and supplier firms visit one another's plants to understand specific obstacles (Simpson & Power, 2005). The leading firm in the supply chain should stimulate supply chain partners and if that is not possible, it should compel them (Michelesen, 2007; Clemens & Douglus, 2006). Companies need to use relationship strategies to motivate their supply chain partners to adopt sustainability practices and develop trust and commitment in a long-term relationship (Cheung & Rowlinson, 2011). This concept is supported by Angeron (2011) who stated that companies need to support and help suppliers instill sustainability within their operations. Hence, relationship management with customers and suppliers is required for implementing sustainability practices across the supply chain (Klassen, et al., 2003), gaining marketing advantage and making profits (Ytterhus, 1999, Zhu, et al. 2008b; Holt, 2009).

Florida (1996) found that the supplier-buyer relationship in a supply chain was essential for the adoption and diffusion of new manufacturing processes. Relationship management has been given importance by many researchers after seeing its contribution to sustainability in the supply chain (Cheung & Rowlinson, 2011). Collaboration and compliance are two options to develop and maintain supply chain relationships (Simpson & Power, 2005). Gold et al., (2009) advocated collaboration with supply chain partners to achieve economic, social and environmental objectives. Lee (2008) stated that supply chain environmental sustainability could be achieved when all parties were engaged in sustainable practices. Therefore, companies need to focus on the type of relationship they have with their supply chain partners (Sange, 2010). The value of sustainability acquired during a firm's operations diminishes if it is not aligned with supply chain partners (Preuss, 2005; Bai & Sarkis, 2010; Angeron et al., 2011).

According to Simpson & Power, 2005

"Supply relationships may provide a key way for businesses to influence the sustainability of their products and services through better manufacturing".

Relationship management is a better approach to manage relationships in the supply chain and influence supply chain partners for adoption of ethical practices (Ellis & Higgins, 2006). A study entitled 'Supply Chain Partnerships to Improve Supply Chain Performance' by Linton et al., 2007 gives a deeper understanding of buyer-supplier relationships and their effect on supply chain sustainability. Many researchers conclude that buyer firms influence supplier firms to adopt sustainability initiatives (Simpson et al., 2007; Michelsen, 2007).

4.4.1 Relationship Strategies for Sustainable Supply Chain

Various relationship strategies like supplier conferences, on-site visits, and the development of joint buyer-supplier teams are necessary for the socialization of the supply chain (Bommel, 2010). Information sharing and mutual commitment are required for improving the performance of a supply chain (Simpson & Power, 2005). Zutshi et al. (2004) found that training and awareness was required for supplier development. Beside this, companies need to monitor their supply chain partners that may or may not be high on collaboration (Vachon & Klassen, 2006). Keatings et al. (2008) advocated the need to coordinate in purchasing, manufacturing and marketing functions. They also suggested the selection and monitoring of suppliers and managing relationships for sustainable business practices. Fortes (2009) focused on the dyadic relationship with suppliers. Bommel (2010) suggested the use of various supplier development strategies to maintain buyer-supplier relationship. He emphasized the need for supplier certification, reducing the supplier base, and pressurizing suppliers as some of the strategies to get them to adopt sustainability practices. Ciliberti et al. (2008) included the concept of clear contracts in relationship development to avoid any inconsistencies.

Relationship development and management activities are discussed in industrial marketing literature. Hadjikhani & LaPlaca (2013) proposed some theoretical foundations of relationship marketing. The relationship management strategies listed in Table 8 (from sustainable supply chain literature) certainly match the foundations of relationship marketing as discussed in industrial marketing literature. These foundations are: resource exchange, interdependency, long-term outlook, cooperation, sharing of risk, and developing the partner. The majority of relationship strategies focus on increasing supplier knowledge and monitoring suppliers. One of the most important outcomes of this section is that 'relationship efforts should be awarded for performance improvement' (Green et al., 1998; Michelsen, 2007). Each time a supplier is selected, an order should be allocated according to the supplier's performance on sustainability standards. Factors such as supplier evaluation, monitoring, mentoring, assessment, selection and development have been discussed along with supplier development strategies like conducting workshops, imparting education, knowledge and sharing of technology (Table 8).

Table 8 Relationship Strategies

Relation Strategies	References
Information sharing and gathering	Bommel, 2010; Wu & Pagell, 2011; Klassen & Vachon, 2003; Nakano & Hirao, 2011; Smith, 2007; Lee, 2008; Vachon & Klassen, 2008; Vachon & Klassen, 2006; Seuring & Muller, 2008; Bai & Sarkis, 2010; Rao, 2002; Koplin et al., 2007; Olorunniwo & Li, 2010; Zhu et al., 2007b; Handfield et al., 2005; Rocha et al., 2007; Bitzer et al., 2008; Ciliberti, 2008; Preuss, 2005; Sharma et al., 2010; Kushwaha, 2011; Brito et al., 2008; Daugherty, 2011; Attaran & Attaran, 2007
Cross functional teams	Bommel, 2010; Lin, 2007; Zhu et al., 2008a; Zhu et al., 2007a; Zhu & Sarkis, 2004; Zhu & Sarkis, 2010; Brito et al., 2008; Pullman et al., 2010; Keatinga et al., 2008

Joint teams	Bommel, 2010; Zhu et al., 2007b; Bitzer et al., 2008; Kushwaha, 2011
Pressure (penalties/fines)	Bommel, 2010; Blowfield, 2005; Michelsen, 2007; Ageron et al., 2011; Pullman et al., 2010; Keatinga et al., 2008,
Incentives and financial support	Bommel, 2010; Nakano & Hirao, 2011; Zhu et al., 2008a; Hamprecht et al., 2005; Ytterhus, 1999; Kogg, 2003; Rao, 2002; Olorunniwo & Li, 2010; Michelsen, 2007; Simpson & Power, 2005; Keatinga et al., 2008
Supplier development	Bommel, 2010; Wu & Pagell, 2011; Seuring & Muller, 2008; Koplin et al., 2007; Handfield et al., 2005; Michelsen, 2007
Technology sharing	Lin, 2007; Zutshi & Sohal, 2004; Rao & Holt, 2005; Vachon & Klassen, 2008; Hall, 2000; Vachon, 2007; Kogg, 2003; Hong et al., 2009; Koplin et al., 2007; Zhu et al., 2007b; Rocha et al., 2007; Zsidisin & Hendrick, 1998; Markley & Davis, 2007; Luthra et al., 2011
Resource allocation	Zutshi & Sohal, 2004; Rocha et al., 2007; Ni et al., 2010; Ageron et al., 2011; Cai et al., 2008; Brito et al., 2008; Daugherty, 2011
Training program	Zutshi & Sohal, 2004; Holt & Ghobadian, 2009; Clemens & Douglus, 2006; Lee, 2008; Vachon & Klassen, 2006; Seuring & Muller, 2008; Kogg, 2003; Rao, 2002; Koplin et al., 2007; Zhu et al., 2007a; Sarkis et al., 2010; Closs et al., 2010; Vermeulen & Ras, 2006; Simpson & Power, 2005; Pullman et al., 2010
Awareness programs	Zutshi & Sohal, 2004; Rao & Holt, 2005; Zhu et al., 2007a
Supplier certification	Bommel, 2010; Wu & Pagell, 2011; Seuring & Muller, 2008; Smith, 2007; Vachon & Klassen, 2006; Peters et al., 2011; Zhu & Sarkis, 2004; Muller et al., 2009
Joint development Programs and integration	Salam, 2008; Holt & Ghobadian, 2009; Seuring & Muller, 2008; Vachon & Klassen, 2006; Seuring & Muller, 2008; Simpson et al., 2007; Rao, 2002; Hong et al., 2009; Olorunniwo & Li, 2010; Peters et al., 2011; Handfield et al., 2005; Clemens & Douglus, 2006; Matos & Hall, 2007; Rocha et al., 2007; Florida, 1996; Ciliberti, 2008; Sharma et al., 2010; Closs et al., 2010; Kushwaha, 2011; Ageron et al., 2011; Cai et al., 2008; Vermeulen & Ras, 2006; Daugherty, 2011; Attaran & Attaran, 2007
Supplier education	Holt & Ghobadian, 2009; Rao & Holt, 2005; Clemens & Douglus, 2006; Lee, 2008; Ytterhus, 1999; Seuring & Muller, 2008; Kogg, 2003; Zhu et al., 2007b; Ciliberti, 2008; Sarkis et al., 2010; Closs et al., 2010; Muller et al., 2009; Smerecnik & Anderson, 2011; Simpson & Power, 2005
Supplier mentoring	Holt & Ghobadian, 2009; Hamprecht et al., 2005; Smith, 2007; Lee, 2008; Darnall, 2008; Vachon & Klassen, 2006; Blowfield, 2005; Vachon, 2007, Rao, 2002; Rao, 2002; Koplin et al., 2007; Handfield et al., 2005; Vermeulen & Ras, 2006; Muller et al., 2009; Keatinga et al., 2008
Knowledge sharing	Klassen & Vachon, 2003; Smith, 2007; Vachon & Klassen, 2008; Darnall, 2008; Vachon & Klassen, 2006; Bai & Sarkis, 2010; Zhu et al., 2008b; Vachon, 2007; Simpson et al., 2007, Rao, 2002, Peters et al., 2011; Rocha et al., 2007; Bitzer et al., 2008; Zsidisin & Hendrick, 1998; Vermeulen & Seuring, 2009; Luthra et al., 2011
Suppliers evaluation and assessment	Klassen & Vachon, 2003; Ytterhus, 1999; Darnall, 2008; Vachon & Klassen, 2006; Vachon, 2007; Koplin et al., 2007, Handfield et al., 2005; Ciliberti, 2008; Zhu & Sarkis, 2004; Brito et al., 2008; Pullman et al., 2010; Keatinga et al., 2008
Site visits	Nakano & Hirao, 2011; Clemens & Douglus, 2006; Ciliberti, 2008
Sharing experience	Nakano & Hirao, 2011; Smith, 2007; Zhu et al., 2008a; Rao, 2002; Brito et al., 2008; Rocha et al., 2007; Muller et al., 2009
Supplier audit	Zhu et al., 2008a; Hamprecht et al., 2005; Seuring & Muller, 2008; Blowfield, 2005; Green et al., 1998; Zhu et al., 2008b; Vachon, 2007; Kogg, 2003; Koplin et al., 2007; Handfield et al., 2005; Ciliberti, 2008; Zsidisin & Hendrick, 1998; Zhu & Sarkis, 2004; Vermeulen & Seuring, 2009; Pullman et al., 2010
Supplier monitoring	Hamprecht et al., 2005; Seuring & Muller, 2008; Smith, 2007; Rao & Holt, 2005; Rao & Holt, 2005; Blowfield, 2005; Green et al., 1998; Vachon, 2007; Koplin et al., 2007; Handfield et al., 2005; Ciliberti, 2008; Brito et al., 2008; Pullman et al., 2010; Keatinga et al., 2008; Buyukozkan & Cifci, 2010
Risk sharing	Hall, 2000; Olorunniwo & Li, 2010; Simpson & Power, 2005
Rating and classification	Green et al., 1998; Michelsen, 2007
Workshop	Vachon, 2007; Koplin et al., 2007; Cheung & Rowlinson, 2011; Muller et al., 2009
Seminar	Vachon, 2007; Koplin et al., 2007

4.4.2 Supplier Selection in Sustainable Supply Chain

Developing a relationship with a supplier is a long process (Ford, 1980; Wilson, 1998). In order to develop a sustainable supply chain, buyer firms in the supply chain need to select appropriate suppliers for developing a relationship (Hutchins & Sutherland, 2008; Ciliberti, 2008; Brito et al., 2008; Rao & Holt, 2005; Tsoulfas & Pappis, 2006; Michelsen, 2007). With any kind of relationship, each party has certain expectations; a buyer firm may look for an improved sustainability performance by the supplier firm while the supplier firm looks for more business from the buyer firm (Zutshi & Sohal, 2004; Rocha et al., 2007). In deciding the allocation of orders, buyer firms should consider suppliers' sustainability performance (Hamprecht et al., 2005; Seuring & Muller, 2008; Smith, 2007). Sustainable supply

indicators can be used for the screening and selection of a supplier or group of suppliers (Hutchins & Sutherland, 2008; Michelsen, 2007; Ciliberti et al., 2008; Brito et al., 2008). The main objective of supplier selection is to make sustainability an integral part of all business activities.

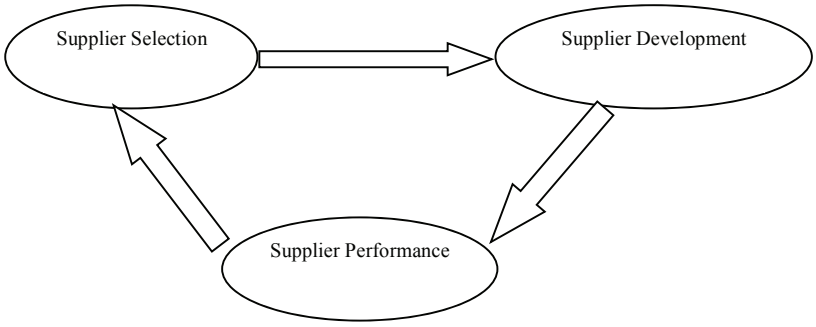

Figure 3 Supplier selection in sustainable supply chain

A supplier assessment is necessary to determine their willingness of sustainability practices adoption, and their needs to carry out such adoption (Keatinga et al., 2008). Hamprecht et al. (2005) found that developing sustainability quality standards and assessing suppliers on those standards was necessary for appropriate supplier selection. Figure 3 illustrates how a sustainable supply chain works (Wilson, 1998): it starts with supplier selection on sustainability standards (Hutchins & Sutherland, 2008; Michelsen, 2007; Ciliberti, 2008; Brito et al, 2008); supplier development activities are decided next (Rao & Holt, 2005; Peters et al., 2011; Rocha et al., 2007; Cai et al., 2008); supplier performance is then measured against sustainability criteria and an order is allocated as sustainability return (Klassen & Vachon, 2003; Ytterhus, 1999; Darnall, 2008; Vachon & Klassen, 2006; Vachon, 2007; Koplin et al., 2007).

4.4.3 Relationship selection

Many studies argue that relationship marketing is not a good option every time (Dowling & Uncles, 1997). Choosing a relationship is important to remain profitable and competitive (Kumar et al., 2003). There is a need of being familiar with supply chain partners before moving ahead with a relationship (Ganesan, 1994). Reinartz & Kumar (2002) stated that relationship selection starts with partner identification and their intention to pursue a relationship in terms of investment and performance.

Researchers have made efforts to classify the different types of relationships in the supply chain. Channel literature first revealed that relationships in a supply chain varied from arm's length to vertical integration (Golicic et al., 2003; Contractor & Lorange 1988; Webster 1992). Many authors have further categorized relationships based on their magnitude. Some of the supply chain relationships are partnerships, alliances, joint ventures, network organizations, franchises, license agreements, contractual relationships, service agreements, and administered relationships (Golicic et al., 2003). In addition, four types of relationships between buyer and supplier have been given by Hansen (2006): transactional, collaboration, co-production and co-creation in term of exchange. Cannon & Perreautt (1999) reported that relationships could be classified into eight categories based on similarity of characteristics and traits: basic buying and selling, bare bones, contractual transaction, customer supply, cooperative systems, collaborative, mutually adaptive, and customer is king. Rinehart et al. (2004) sought the help of practitioners to categorize relationships on the basis of certain characteristics. The relationships thus categorized were: non-strategic transactions, administered relationships, contractual relationships, specialty contract relationships, partnerships, joint ventures, and strategic alliances. Leek et al. (2002) found companies used one or more of the following relationship management methods: formal documented system, personal judgment and meetings.

Table 9 shows the forms of relationships mentioned in sustainable supply chain literature to address supply chain relationships. Focal firms develop relationships with particular suppliers according to their capacity, capability, expected performance and outcome of the relationship. Sometimes, buyer firms want to keep the relationship only at arm's length while in other cases, buyers seek to develop a relationship oriented towards mutual development and growth (Moeller et al., 2006). There are two criteria for relationship evaluation: the value created through the relationship, and resultant value of the relationship (Li, 2011). The former emphasizes that relationship value is created through interaction while the latter asserts that value is the result of the relationship.

A relationship can be classified on the basis of duration of the relationship and the investment required in developing and maintaining the relationship. The type of relationship depends upon the capability, capacity, and intention of the supplier to adopt sustainability (Gao et al., 2005; Murray et al., 2005).

Developing relationships with supply chain partners can be a solution for sustainability adoption. However, developing a relationship is not an easy task (Ford, 1980). It includes many stages and warrants efforts from both parties (Dwyer, 1987). In a relationship, both parties should be fully involved. Parties can share assets, funds, and other physical and non-physical assets in order to achieve objectives. Investment by companies would depend on results living up to expectations.

Table 9: Relationship key words used in sustainable supply chain

Relationship Keyword	References
Coordination	Bommel, 2010; Carter & Rogers 2008; Darnall, 2008; Hall, J., 2000; Hong et al., 2009; Matos & Hall, 2007; Bitzer et al., 2008; Keatinga et al., 2008; Senge & Prokesch, 2011
Trust	Bai & Sarkis, 2010; Peters et al., 2011; Matos & Hall, 2007; Bitzer et al., 2008; Zsidisin & Hendrick, 1998; Carter & Jenning, 2002; Ageron et al., 2011; Daugherty, 2011; Ellis & Higgins, 2006
Long and strong supply chain relationship	Bommel, 2010; Teuteberg & Wittstruck, 2010; Asif et al., 2008, Hutchins & Sutherland, 2008; Tsoulfas & Pappis, 2006; Hall, 2000; Zhu et al., 2008b; Rao, 2002; Peters et al., 2011; Handfield et al., 2005; Bitzer et al., 2008, Zsidisin & Hendrick, 1998; Carter & Jenning, 2002; Sarkis, 1995; Closs et al., 2011; Linton et al., 2007; Cai et al., 2008; Vermeulen & Ras, 2006, Muller et al., 2009; Walton et al., 1998; Brito et al., 2008; Pullman et al., 2010, Attaran & Attaran, 2007; Markley & Davis, 2007; Keatinga et al., 2008; Luthra et al., 2011
Stakeholder relationship and engagement	Zutshi & Sohal, 2004; Peters et al., 2011; Matos & Hall, 2007; Rocha et al., 2007; Carter & Jenning, 2002; Sarkis et al., 2010; Muller et al., 2009; Pullman et al., 2010; Ellis &Higgins, 2006; Cramer, 2007
Cooperation	Bommel, 2010; Klassen & Vachon, 2003; Zhu et al., 2008a; Lee, 2008; Vachon & Klassen, 2008; Tsoulfas & Pappis, 2006; Vachon & Klassen, 2006; Green et al., 1998; Zhu et al., 2008b; Zhu et al., 2007a; Zhu et al, 2007b, Handfield et al., 2005; Ciliberti, 2008; Zsidisin & Hendrick, 1998; Cheung & Rowlinson, 2011; Sharma et al., 2010; Ageron et al., 2011; Cai et al., 2008; Vermeulen & Ras, 2006; Smerecnik & Anderson, 2011; Bowen et al., 2001; Elkington, 1994; Simpson & Power, 2005; Buyukozkan & Cifci, 2010; Cramer, 2007
Partners' Involvement	Holt & Ghobadian, 2009; Rao & Holt, 2005; Bai & Sarkis, 2010; Hong et al., 2009; Bitzer et al., 2008
Partnership	Bommel, 2010; Svensson, 2007; Klassen & Vachon, 2003; Zhu et al., 2008b; Hamprecht et al., 2005; Rao & Holt, 2005; Ageron et al., 2011; Ellis & Higgins, 2006; Markley & Davis, 2007; Fortes, 2009; Svensson, 2009
Integration with supply chain partners	Bommel, 2010; Carter & Rogers 2008; Rao & Holt, 2005; Walker et al., 2008; Vachon & Klassen, 2008; Routroy, 2009; Vachon & Klassen, 2006; Bai & Sarkis, 2010; Hong et al., 2009; Koplin et al., 2007; Olorunniwo & Li, 2010; Handfield et al., 2005; Rocha et al., 2007; Ciliberti, 2008; Zhu & Sarkis, 2004; Kushwaha, 2011; Cai et al., 2008; Muller et al., 2009; Walton et al., 1998; Brito et al., 2008; Curkovic & Sroufe, 2010; Fortes, 2009
Collaboration	Asif et al., 2008; Diabata & Givindanb, 2011; Salam, 2008; Klassen & Vachon, 2003; Nakano & Hirao, 2011; Walker et al., 2008; Lee, 2008; Darnall, 2008; Vachon & Klassen, 2006; Bai & Sarkis, 2010; Eltayeb et al., 2011; Simpson et al., 2007; Kogg, 2003; Koplin et al., 2007; Olorunniwo & Li, 2010; Peters et al., 2011; Matos & Hall, 2007; Zsidisin & Hendrick, 1998; Preuss, 2005; Zhu & Sarkis, 2004; Ni et al., 2010; Cheung & Rowlinson, 2011; Sharma et al., 2010; Vermeulen & Seuring, 2009; Closs et al., 2010; Ageron et al., 2011; Zhu & Sarkis, 2010; Attaran & Attaran, 2007; Buyukozkan & Cifci, 2010; Gold et al., 2009; Kudla et al. 2012
Joint development Programs	Salam, 2008; Seuring & Muller, 2008; Vachon & Klassen, 2008; Simpson et al., 2007; Florida, 1996; Senge & Prokesch, 2011; Seuring & Muller, 2008; Peters et al., 2011; Rao & Holt, 2005; Hong et al., 2009; Zsidisin & Hendrick, 1998
Influence- power use and code of conduct	Clemens & Douglus, 2006; Eltayeb et al., 2011; Michelsen, 2007; Hamprecht et al., 2005

Buyer firms can develop a supplier selection model for order allocation and then decide the type of relationship to be developed. Relationship type selection is based on the capacity, capability, and current performance of the supplier (Lee et al., 2009). In selecting a relationship type, the buyer firm should consider the trade-off between cost and risk, and opportunities and benefits of a relationship with a particular supplier. Walker et al. (2008) found that buyer-supplier collaboration provided opportunities for a win-win situation.

There is ample evidence in sustainable supply chain and relationship marketing literature that each relationship brings certain benefits, costs, risks, and opportunities. Some of the benefits quoted in the literature are: financial benefits (Eltayeb et al., 2011: Hong et al., 2009: Peters et al., 2011), operational benefits (Zsidisin & Hendrick, 1998: Brito et al., 2008: Daugherty, 2011) and sustainability adoption (Nakano & Hirao, 2011: Seuring & Muller, 2008; Smith, 2007; Rao & Holt, 2005) (Figure 4).

Some of the financial benefits of developing relationships are reduced cost of distribution (Closs et al., 2010), reduced inventory (Attaran & Attaran, 2007) and low cost of information (Hong et al., 2009). Operational benefits include resource optimization, improved internal process and on time delivery (Zsidisin & Hendrick, 1998; Brito et al., 2008). Sustainability practices adoption includes low external pressure, improved products from sustainability criteria and a sustainable supply chain (Rocha et al., 2007).

Various opportunities are marketing and competitive advantages, improved technical capabilities of supply chain partners, and mutual growth (Hall, 2000; Ageron et al., 2011). As mentioned above, the formation of every relationship also incurs a cost. This cost includes the cost of the relationship, relationship performance and the cost of adoption (Buyukozkan & Cifci, 2010). Cost has been found to be the biggest barrier to sustainability adoption. Risk is related to the managerial capability of managing a relationship and achieving sustainability objectives. Market related risks are dependent on a few suppliers, the bargaining power of the supplier, and possible forward integration by the supplier in future. Investment related risks include investment for introducing changes, developing the

relationship and improving its performance, and dissolving the relationship in between (Cramer, 2007). Various studies have suggested legalizing relationships by contracts to avoid certain risks (Ciliberti et al., 2010; Ni et al., 2010; Carter & Rogers, 2008).

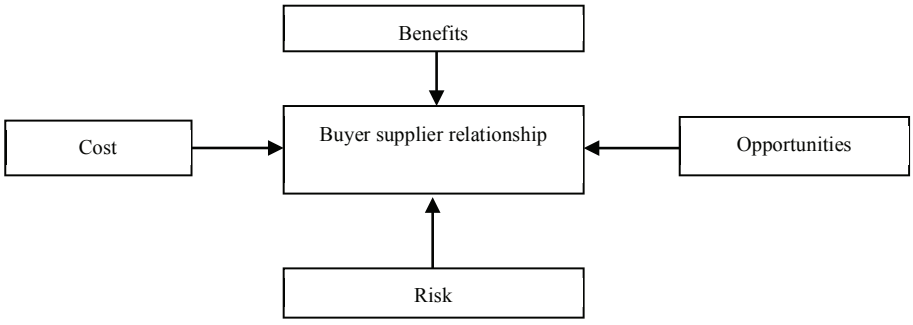

Figure 4 Benefits, cost, opportunities, and risk effect on buyer-supplier relationships

On the basis of the discussion above, it can be summarized:

- The impact of various relationship management strategies on sustainability performance of the supply chain, and their relevance and significance in different contexts and scenarios is an area for future research. For example, given that the suppliers being considered are willing to adopt sustainability practices, the relationship management strategy would differ where there are two or more alternative buyers located at different places (distances would differ), possess different technological capability or have dissimilar financial assets/situations. No one strategy can be equally applicable to all these scenarios.
- There is a need to develop a supplier selection model for a sustainable supply chain based on sustainability indicators. The indicators mentioned in literature can be used for supplier selection. Further, extant literature on buyer-supplier selection uses various methodologies such as linear programming method for order optimization based on sustainability performance, analytical hierarchy programming (AHP), analytical network programming (ANP) and DEMETAL among many others. Some researchers have integrated these methodologies with fuzzy logic.
- There is a need to develop an effective and efficient relationship selection model to choose a supplier the relationship with whom would be most rewarding to the buyer firm. The model so developed must consider the benefits, opportunities, cost, and risk involved if the relationship is established.

4.5 Sustainability Adoption Mechanism: An integrated framework

In this section an integrated framework of sustainable supply chain is presented bases on the discussion in previous sub sections (4.1 to 4.4). The reputation and business of focal firms are deeply affected if the actions of their suppliers are questioned on the basis of practices followed. Thus, these firms are more concerned with developing a sustainable supply chain and maintaining relationships with suppliers who follow sustainability practices. This attitude of focal firms has forced supply chain partners to adopt sustainability practices. A conceptual model for developing a sustainable supply chain is shown in Figure 8. The process of sustainability practices adoption across the supply chain or by supply chain partners begins with developing top management commitment towards sustainability (Smith, 2007; Rao & Holt, 2005). This commitment can be developed by creating external pressure from appropriate agencies and awareness about sustainability and its expected benefits (Walker et al, 2008).

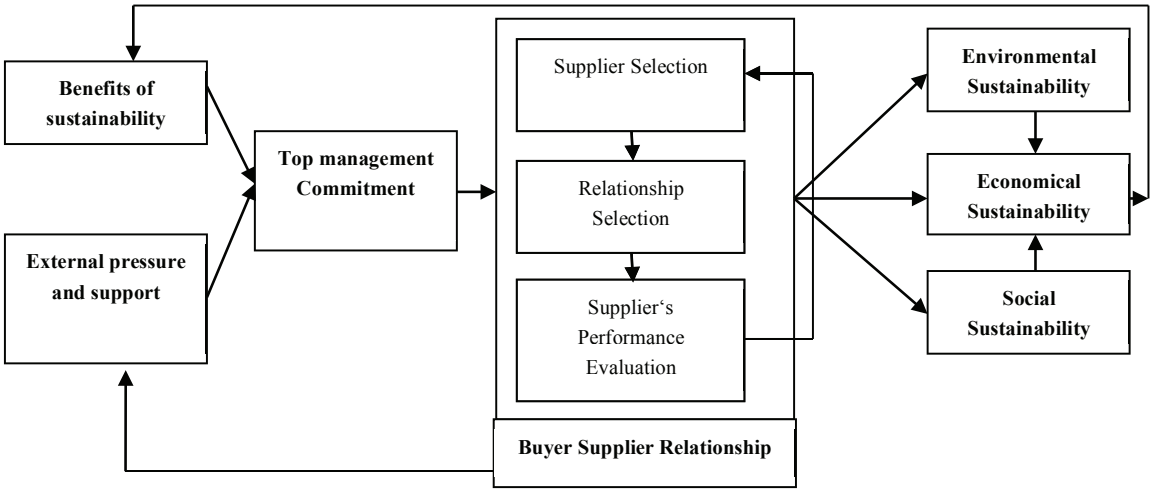

Figure 8 Sustainability adoption mechanisms in supply chain

The expectation of support from various agencies for sustainability adoption helps develop commitment. For example, tax rebate from the government for increasing sustainability performance and expected support from supply chain partners. Nevertheless, there are certain challenges a committed top management generally faces when incorporating sustainability practices such as cost of adoption and re-engineering supply chain processes, lack of infrastructure, technological requirements and human capabilities among many others.

A buyer firm in a supply chain should first select a supplier based on sustainability standards. This is equivalent to rewarding the efforts of suppliers for increasing sustainability performance. The selected suppliers should also be assessed on the basis of their capability and capacity during the relationship selection process (Hutchins & Sutherland, 2008). Relationship marketing literature indicates that relationship development and reaching the level of joint development is not always economical and successful (Hadjikhani & LaPlaca, 2013). A partner should be selected based on the expected outcomes of the relationship and the required level of investment. Relationship selection should also include other criteria such as cost, benefits, opportunity, and the risk of relationship with each supplier.

The performance of the relationship should be evaluated in terms of sustainability (Ashby et al., 2012). The relationship selection process helps companies concentrate on each supplier and their specific needs. Suppliers that demonstrate high performance on sustainability standards should be rewarded with additional order allocations. Poor sustainability performance of a supplier can lead to modification or termination of the buyer-supplier relationship. A number of researchers have also reported that environmental and social sustainability contributes to economic sustainability in the long run. An improved performance of the supply chain will increase the benefits of sustainability adoption. This will reinforce the commitment of buyers and sellers to adopt sustainability. Since sustainability adoption is a continuous and on-going process, it needs continuous support from the supply chain partners.

5. Conclusion and Managerial Implications

This study attempts to address the issue of sustainability adoption across the supply chain. Based on existing literature, enablers of and barriers to sustainability adoption have been identified. Also, several relationship management strategies have been listed. It can be concluded on the basis of the literature review that most problems related to sustainability adoption can be solved with the help of relationship management. As mentioned earlier, several measures have been taken to avoid compromising the quality of research. This review suggests that the final product's sustainability performance can be enhanced by improvements in the supply chain performance. This research also points out that companies adopt sustainability for two reasons: 1) external influence from multiple agencies like governments, NGOs and media among others, and 2) the benefits of sustainability adoption by supply chain partners such as improved reputation, product differentiation, premium pricing and more. Buyer Supplier relationship is very useful for developing a sustainable supply chain. Firms should be conscious of this when developing a relationship. A suitable tradeoff between the benefits, opportunities, costs and risks should be maintained. Before developing a relationship, selection of the supplier based on sustainability standards should be done. Relationship management increases the sustainability performance of the supply chain and reduces resistance towards sustainability adoption.

This paper will benefit academics and managers by providing them with indicators of a sustainable supply chain, various external sources that may exert pressure, expected outcomes of sustainability adoption and relationship management strategies. This research also provides an integrated framework that could be used for developing a long lasting sustainable supply chain. Existing literature has implications for the leading firm. It is important to know the enablers of sustainability adoption. Understanding different enablers will help the leading firm formulate strategies to manage suppliers. Understanding barriers specific to a particular supplier helps comprehend the capacity, capability, and problems of the supply chain partner. This would assist the lead firm in deciding whether to continue with a particular supplier. In line with this, the leading firm should select suppliers based on sustainability standards. Suppliers performing better on those standards and with the capacity to fulfill orders should be selected. Similarly, the selection of relationship type with each supplier should be done after analyzing the benefits, costs, risks and relationship opportunities with the particular supplier (Cramer, 2007).

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